

NAUTICAL CHART ACTIVITIES IN THE U.S. ARMY CORPS OF ENGINEERS

NOAA Open House on Nautical Cartography

27 July 2018

Tony Niles

Headquarters, Directorate of Research and Development

441 G St, NW

Washington, DC



US Army Corps
of Engineers®



USACE NAVIGATION MISSION

Provide safe, reliable, efficient, effective and environmentally sustainable waterborne transportation systems for movement of commerce, national security needs, and recreation.

COASTAL NAVIGATION ASSETS

- 19 lock chambers
- 13,000 miles of channels
- 929 navigation structures
- 844 bridges



INLAND NAVIGATION ASSETS

- 27 Inland River Systems
- 207 lock chambers @ 171 lock sites
- 12,000 miles of inland river channels



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EXTENSIVE WATERWAY MAINTENANCE AND CONSTRUCTION ACTIVITIES

***** *Resulting in timely and accurate chart data* *****

Authorized Navigation Channel Projects

- High Use: > 10M tons 56
- Moderate Use: 1M to 10M tons 74
- Low Use: < 1M tons 938



Channel dredging averages 280M cubic yards per year



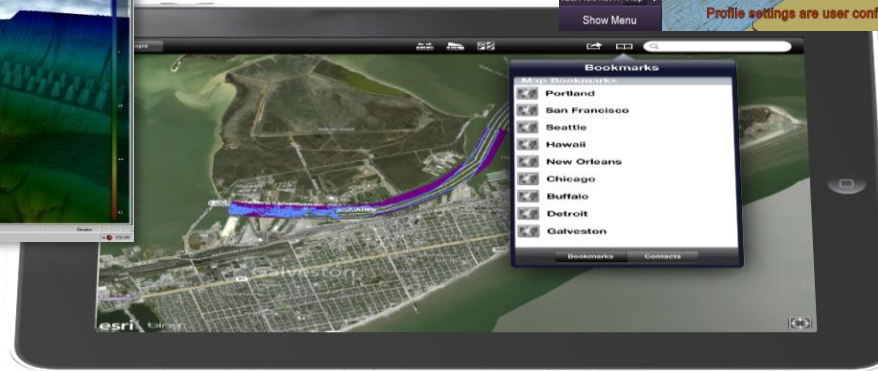
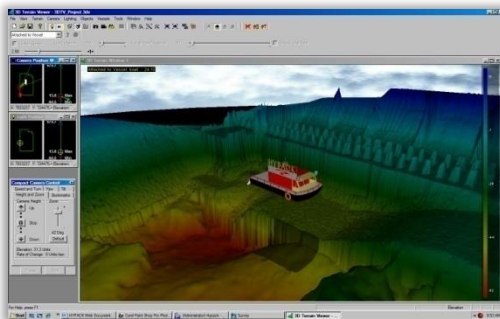
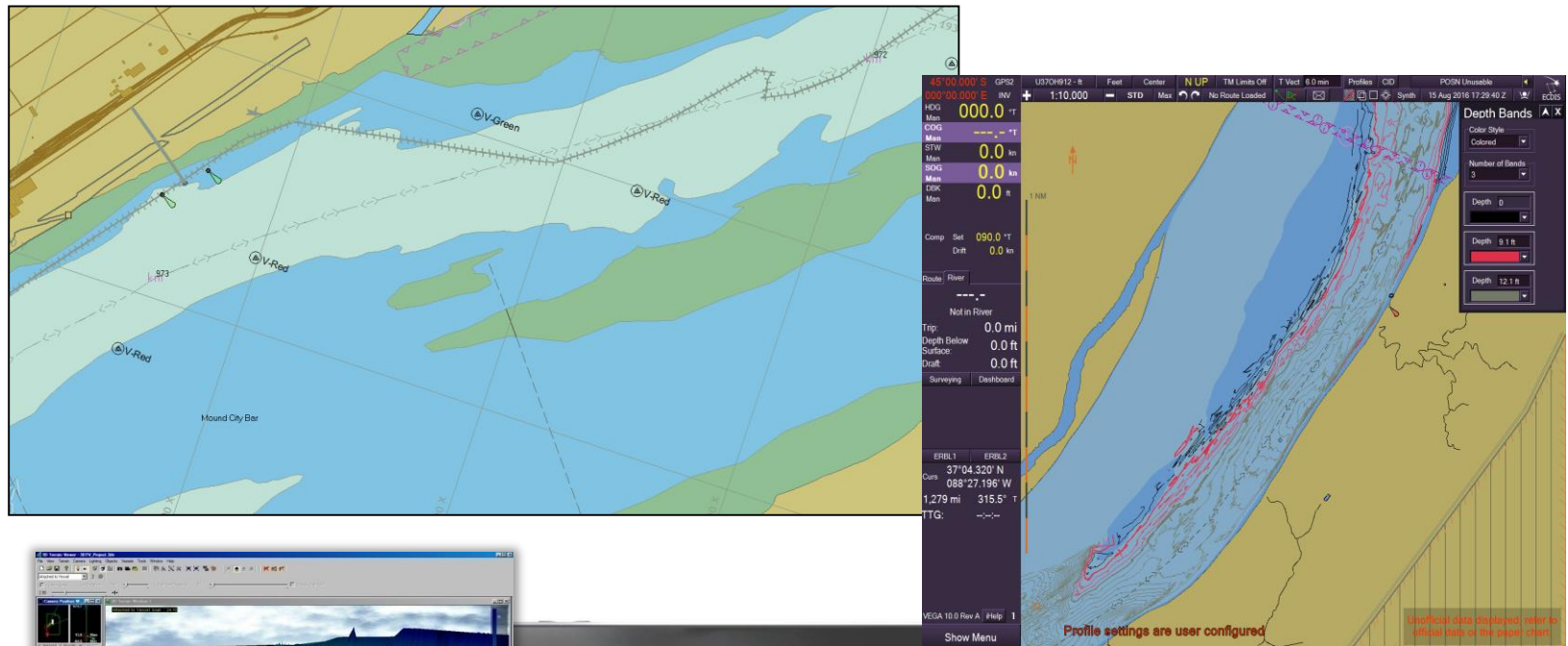
55 Inhouse Hydrographic Survey Vessels



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INLAND ELECTRONIC NAVIGATIONAL CHARTS (IENCs)



Corps
of Engineers®



INLAND ENC COVERAGE IN USA

- 107 IENC cells covering over 7,200 miles
- 21 Rivers
- Charts are produced to the IENC 2.3 Standard
- All charts are reviewed monthly and updated, as necessary.



USACE IENC



**Coastal and
Great Lakes
Coverage**



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15 USACE Districts & US Army Geospatial Center




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CHART DISCREPANCY REPORTING SYSTEM

<https://ienc-report.usace.army.mil/>

**US Army Corps of Engineers**
IENC Chart Discrepancy Reporting System

menu

BUILDING STRONG®

Home

Login

Signed in as:

Reference Links

- About Our Program >
- Help >
- Contact Information >

Welcome to the IENC Chart Discrepancy Reporting System

The IENC Chart Discrepancy Reporting System provides registered users the opportunity to report inaccuracies in and problems with IENC charts.

Do You Need An Account?

If you are not a registered user, click the button below.

[Register For An Account](#)

Registered Users:

If you are a registered user, log in here.

[Login To My Account](#)



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IENC CLOUD BACKGROUND



- Federal Geographic Data Committee (FGDC) issued an RFP in Dec, 2011 to sponsor pilot project with 10 Federal agencies to distribute their public data free for one year on Amazon Web Services (cloud), ending March, 2013. Named the **Geocloud Program**.
- IENC was chosen because of relatively small dataset and expertise with ArcGIS. Approval was given by CIO, USACE to distribute public navigation data on AWS
- <https://www.ienccloud.us>



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IENC CLOUD BACKGROUND



- Advantages include
 - very high reliability of server performance
 - cost effective data hosting
 - scalable CPU availability
 - remote access for data updates
- ArcGIS Server 10.1
 - Over 6000 GIS layers uploaded
 - Clients
 - ArcMap, ArcGIS Explorer
 - ArcGIS JavaScript
 - Google Earth
 - ArcGIS.com
- Experienced over **9 million** downloads



INTERNATIONAL IENC STANDARDS AND DEVELOPMENT



- Non-Governmental International Organization recognized by IHO
- Organized to develop and to maintain a standard for IENCs world-wide
- Standard based on the existing standards of International Hydrographic Organization for 'maritime' ENC's (S-57)
- Currently working to align the S-401 IENC standard with the maritime S-101 standard

Members

Austria	Belgium
Brazil	Bulgaria
China	Czech Rep
France	Germany
Hungary	Italy
Netherlands	Peru
Poland	Romania
Russia	Serbia
South Korea	United States
Venezuela	



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WHY AN “INLAND” STANDARD?

Examples of unique features found in waterways which are not found in maritime waters

- Casino / Gaming Boats

- Fleeting Areas

- Ice Breakers

- Lock Guide Walls

- Exceptional Navigation Structures (Lift bridges/viaducts)

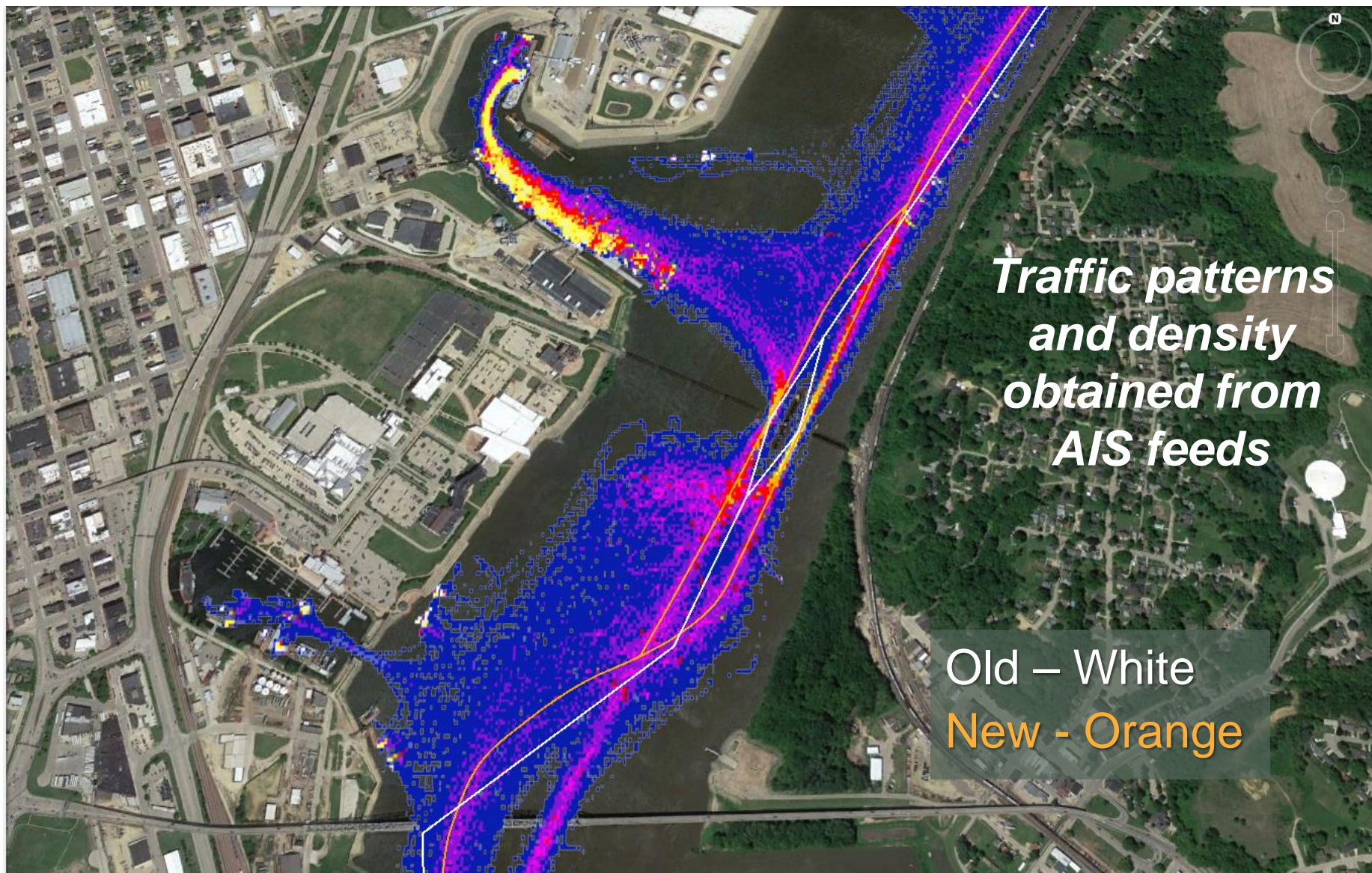


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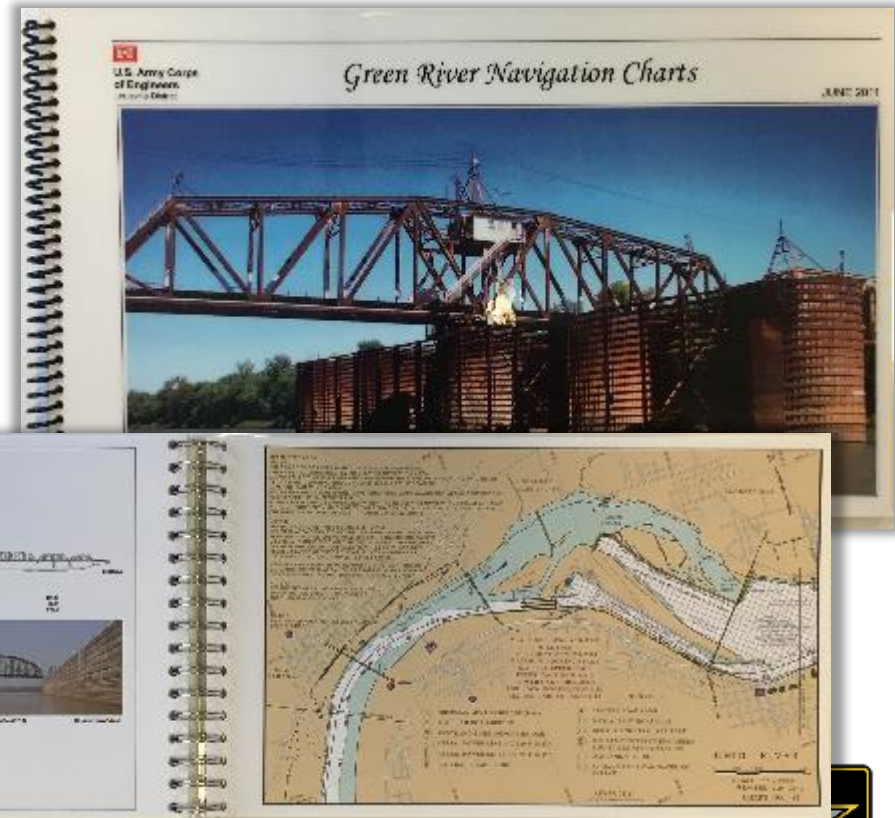
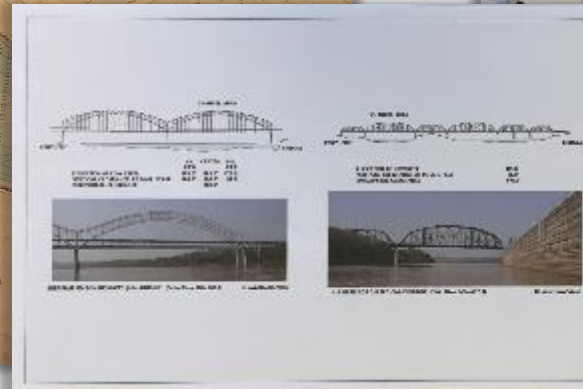
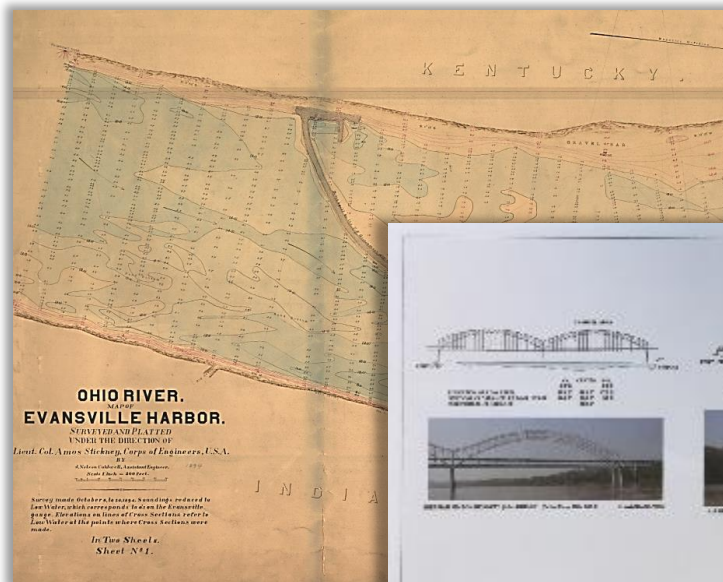
CROWD-SOURCED FEATURE: SAILING LINE

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INLAND CHART BOOKS – *STILL PRODUCED AND AVAILABLE*

- Compiled from Computer-Aided Design and Drafting files
- Working toward common database with IENCs



“PRINT ON DEMAND” PAPER CHARTS GOVERNMENT PUBLISHING OFFICE (GPO)

The screenshot shows the U.S. Government Bookstore website. The top navigation bar includes links for 'My Account', 'Federal Agencies', 'Non-USA Customers', and 'Help & Contact'. A search bar is prominently displayed with the text 'Search our store by keyword, title, agency, ISBN or ID'. Below the search bar, there are tabs for 'Browse ALL Topics', 'New Releases', 'Read Sellers', 'News & Features', 'eBooks', 'Data Products', 'CFRs', 'Subscriptions & Magazines', 'Standing Orders', 'Fliers & Catalogs', and 'Sale & Clearance'. The main content area is titled 'USACE Navigational Charts' and features a large image of a river navigation chart. Text on the page describes the U.S. inland navigation system, which consists of 8,200 miles of navigable rivers maintained by the U.S. Army Corps of Engineers. It also mentions that the U.S. Coast Guard requires commercial vessels to maintain on-board navigation charts or maps appropriate to the area of operation. A sidebar on the left lists various topics and agencies. At the bottom, there is a section for 'Browse by Agency' with a list of agencies including Congress & Legislative Branch, Department of Agriculture (USDA), Department of Commerce (DOC), Department of Defense (DOD), and others. The main product listing shows 'Kanawha River Navigation Charts: Point Pleasant to Alloy, West Virginia (2016)' by Defense Dept., Army, Corps of Engineers. The price is \$35.00 and the quantity is 1. There is an 'ADD TO CART' button. Below this, another product listing is visible for 'McClellan-Kerr Arkansas River Navigation System (MKARNS) From the Confluence of the White River and Mississippi River to the Verdigris River at the Port of Catoosa Near Tulsa, Oklahoma (2016)' with a price of \$63.00.

A One-Stop-Shop for all USACE Paper Chart Books

– 20/22 Chart Books Available

- 1 to be released in 2017
- 1 to be released in 2018

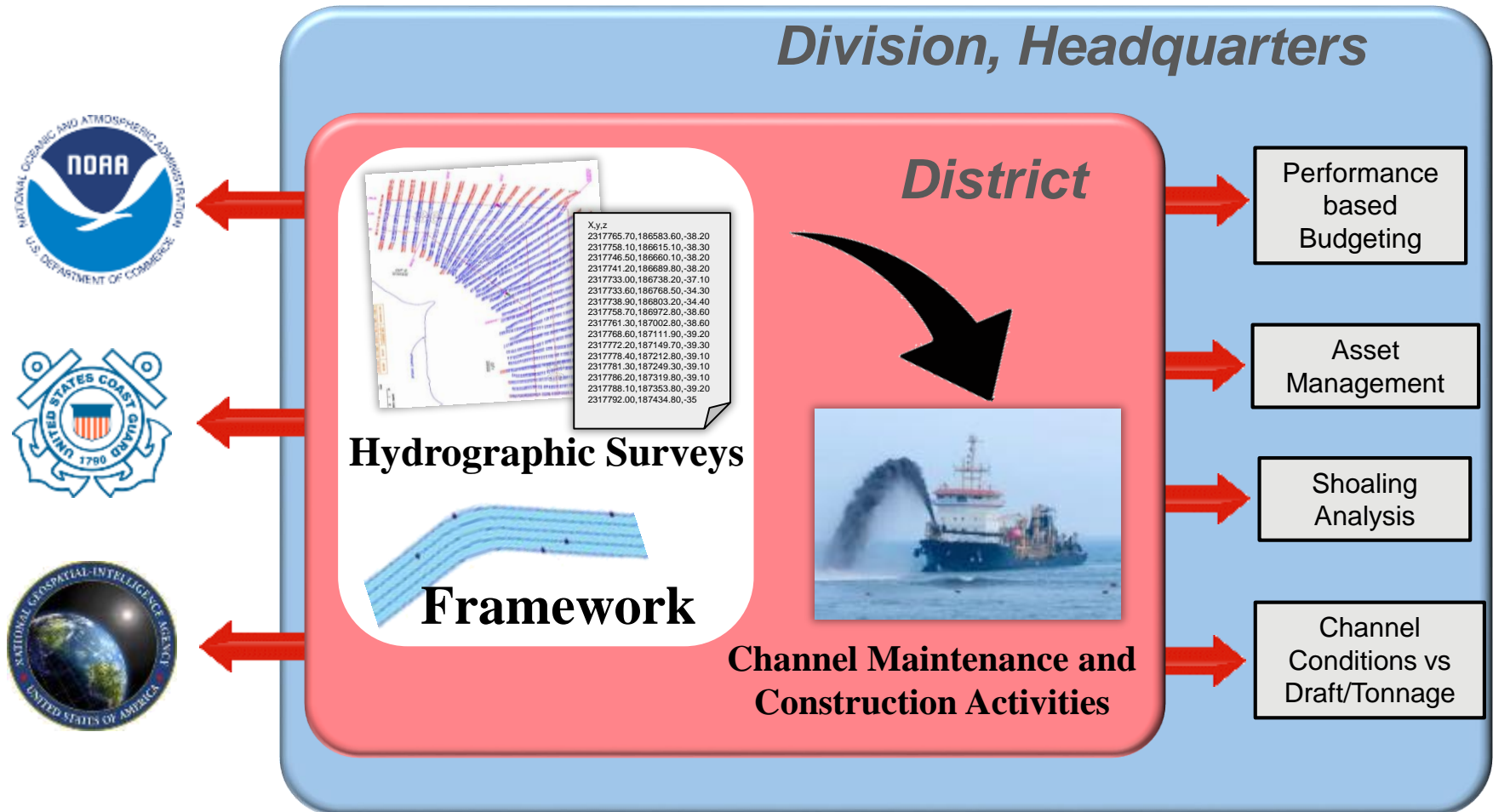
Current production guidance

– EP 1130-2-520 NAVIGATION AND DREDGING OPERATIONS AND MAINTENANCE GUIDANCE AND PROCEDURES

<https://bookstore.gpo.gov/agency/1784>



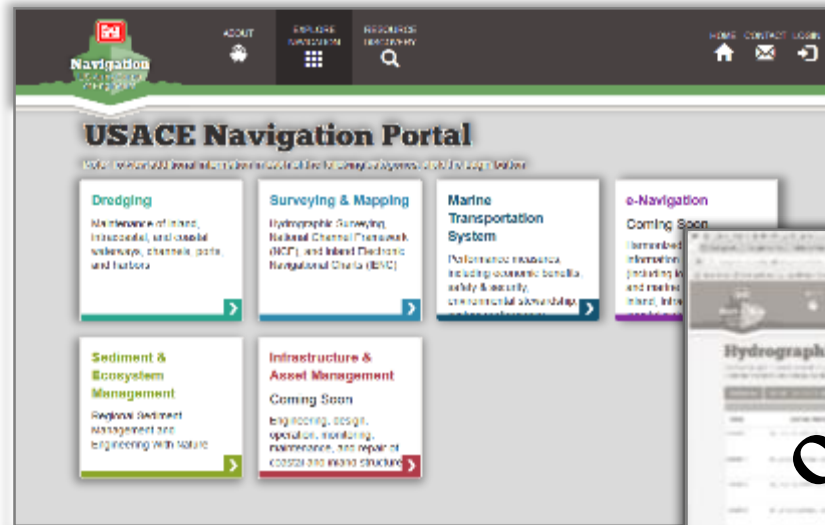
Navigation Channel Data Needs



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eHydro Application and Reporting Process



Official,
Authoritative
Data

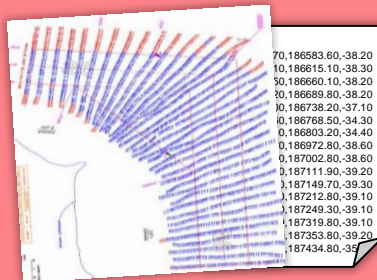


District

eHydro Application



Framework



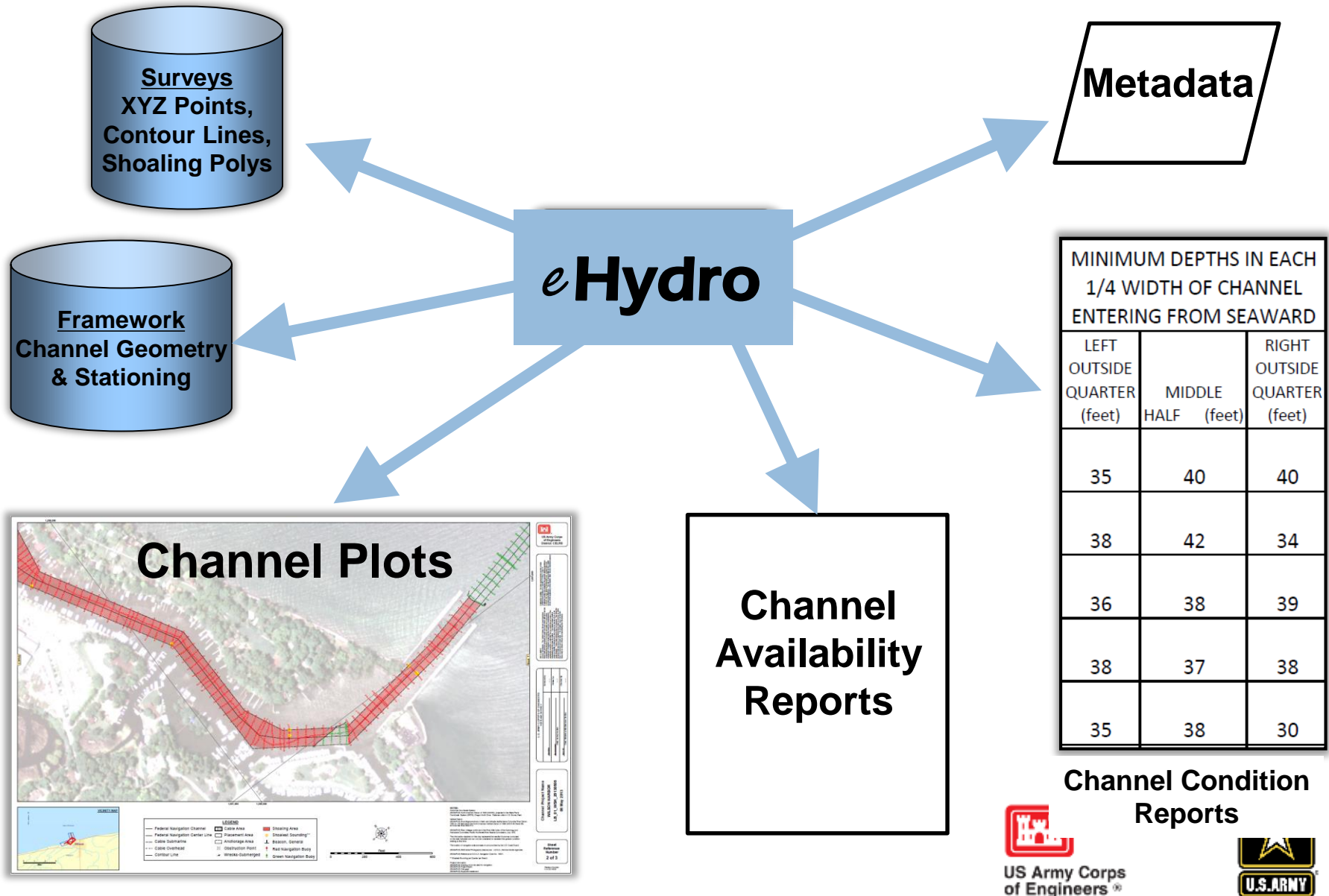
Surveys



Channel Maintenance and
Construction Activities



eHydro Outputs



eHydro Portal

USACE Hydrographic Surveys powered by eHydro

USACE District:
All

USACE Channel:
All

Channel ID:
All

Survey Date Range:
All Surveys Last 60 days
Custom Date Range

Use the dropdown menus or simply pan and zoom on the map to filter the Hydrographic Survey data.

Use any combination to drill down to the data you are interested in. To remove the filter, set the filter to "All".

Select Survey:
To download a survey, either click Download Data in the Survey List below or click on a survey footprint (green area) and then click Download Data

District: CENAO
Name: DEEP CREEK (AIWW)
Survey ID: IW_05_ADC_20180208_CS
Survey Date: 2/7/2018
[Download Data](#)

District: CENAO
Name: CRANEY ISLAND REHANDLING BASIN
Survey ID: NH_11_CIR_20171218_CS
Survey Date: 12/17/2017
[Download Data](#)

District: CENAO
Name: HAMPTON
Last update: a few seconds ago

Survey List

Number of Surveys
30,898
1,079 last 60 days
Last update: a minute ago

Earthstar Geographics, CNES/Airbus DS | USACE | ...

U.S. ARMY Corps of Engineers

Inland eHydro Channel Analysis

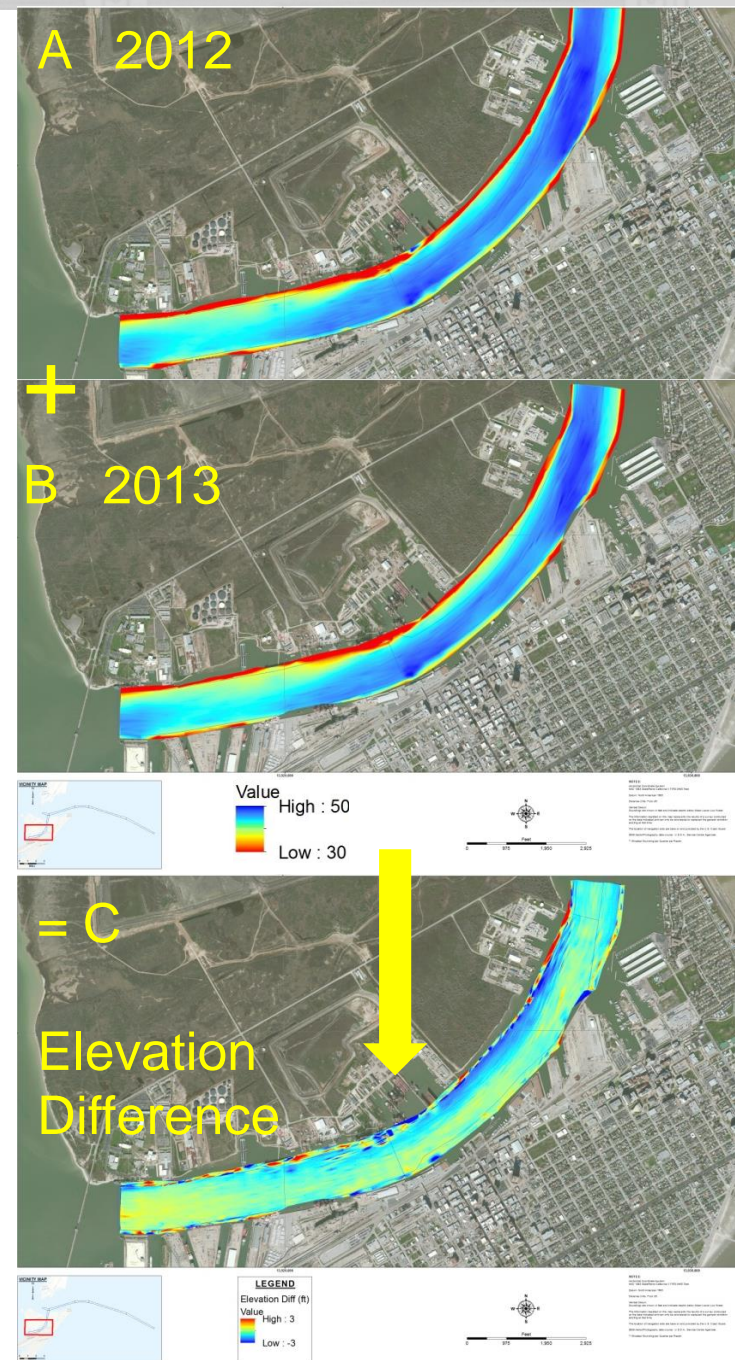


- AIS-generated sailing line plotted between shorelines
- critical navigation depth contour plotted from the survey
- Lines perpendicular to the sailing line, known as “fishbones”, are plotted

- fishbones trimmed to 9' contour, and only longest continuous pieces of fishbones that intersect the sailing line are retained.
- shortest line, highlighted in this example – 487', represents the most constrained section of channel.

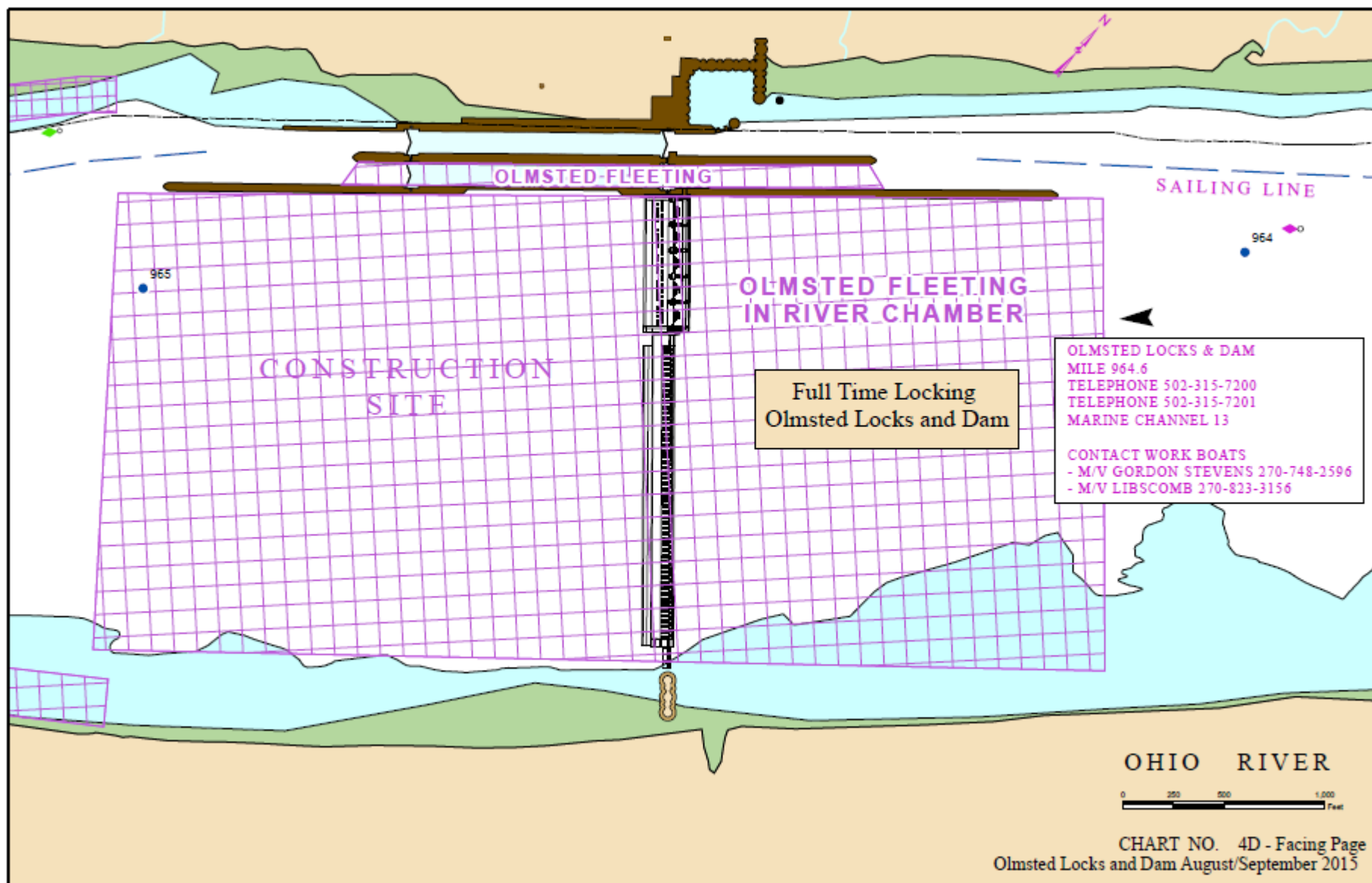
CORPS SHOALING ANALYSIS TOOL

- Use historical survey data from **eHydro** and generate difference grid sets between dredging events
 - Predict average shoaling rates and dredging requirements per channel reach
 - Report volumes at different depth/time intervals and shoaling rates
 - *Efficiently process large spatial datasets*
- Outputs to users: map, shoaling rate table



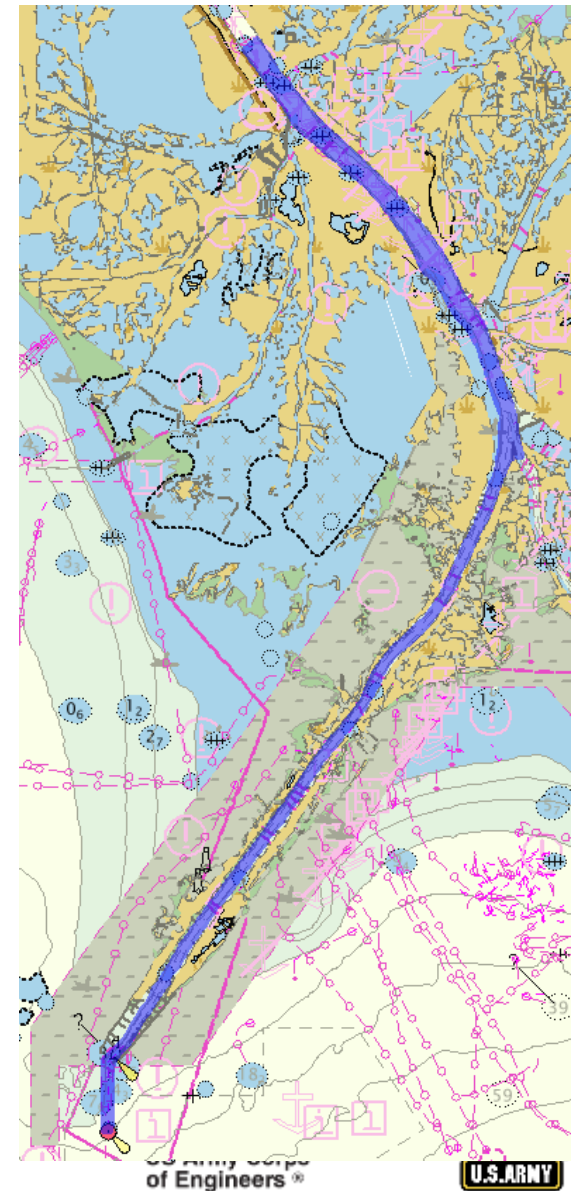
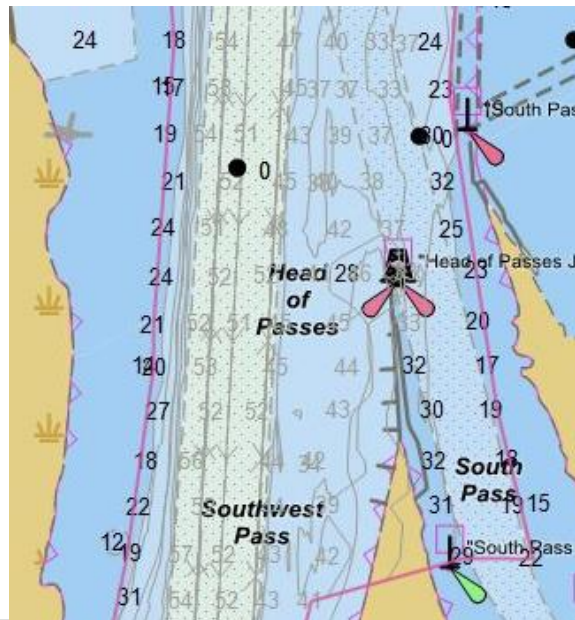
RIVER CONSTRUCTION NOTICE TO INDUSTRY

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IENC OVERLAY: MISSISSIPPI RIVER (SOUTHWEST PASS)

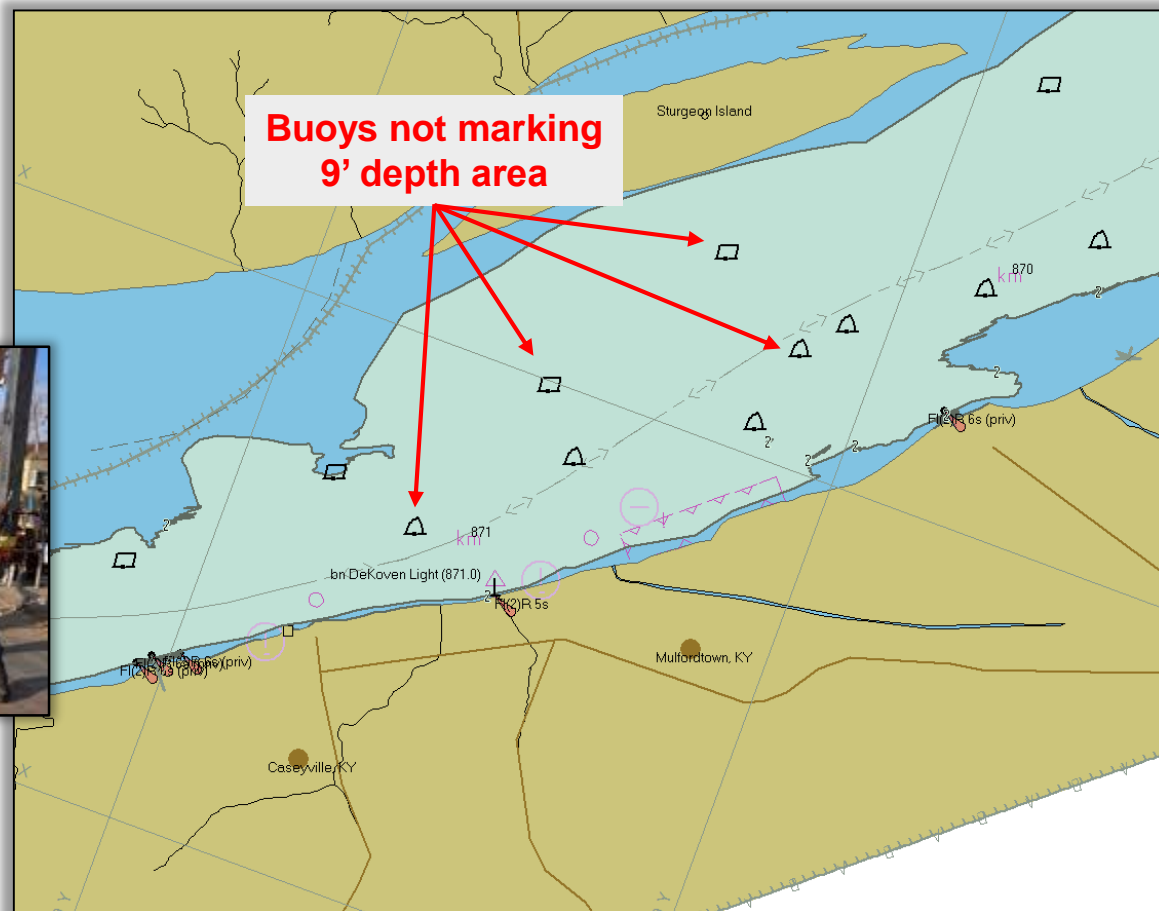
- USACE survey data for SW Pass → updated weekly
- Overlay file, 3UASW000 overlays on NOAA ENC's (US4LA30M & US4LA33M)
- USACE Survey data for 3 other areas on the Lower MS River → updated monthly or as needed



Federal Agency Need:

Buoy Placement On Inland Waterways

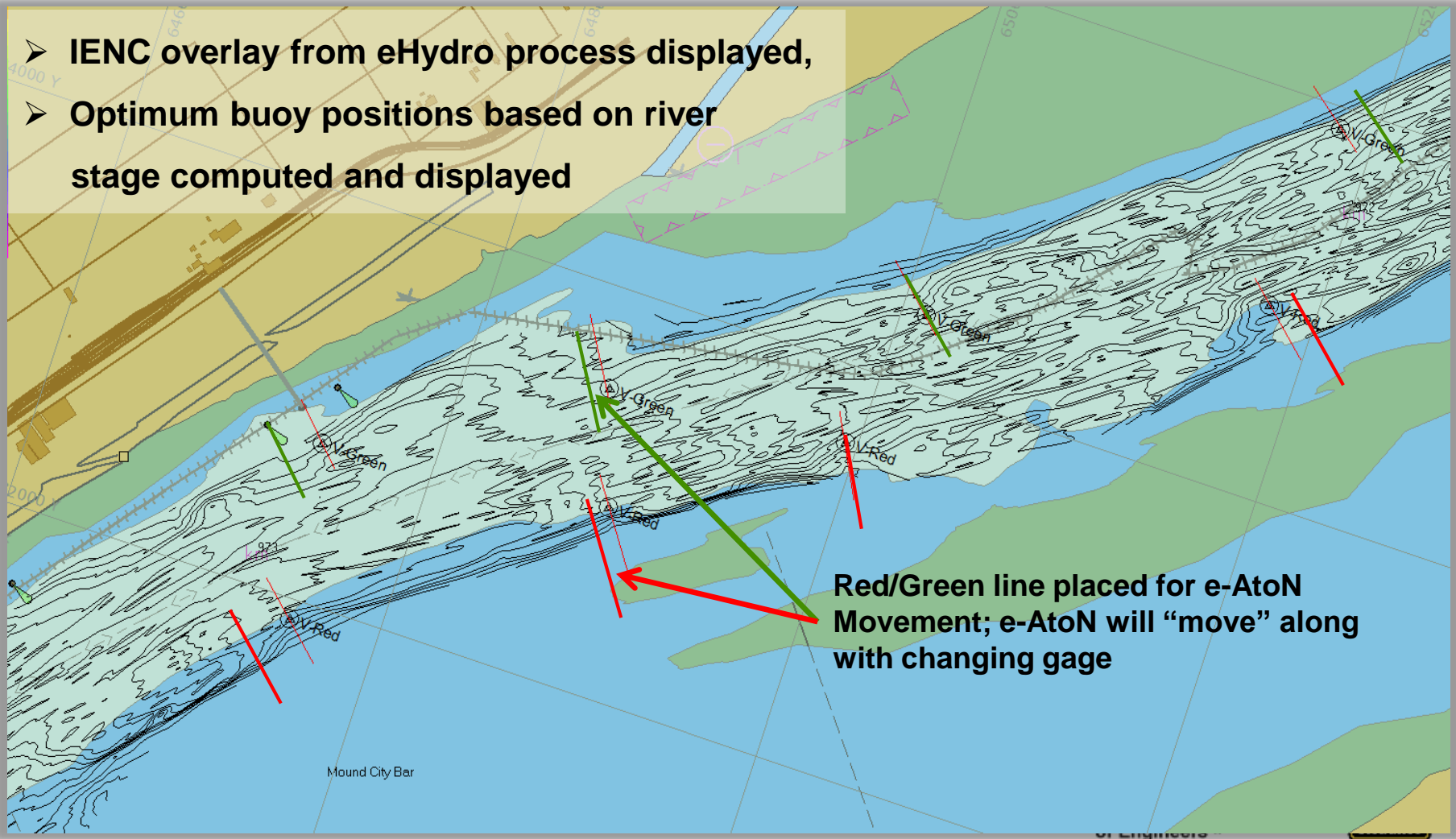
- USCG river tenders need latest conditions to place buoys
- Chart overlay needed to guide operators



Sample Inland Survey Overlay from eHydro

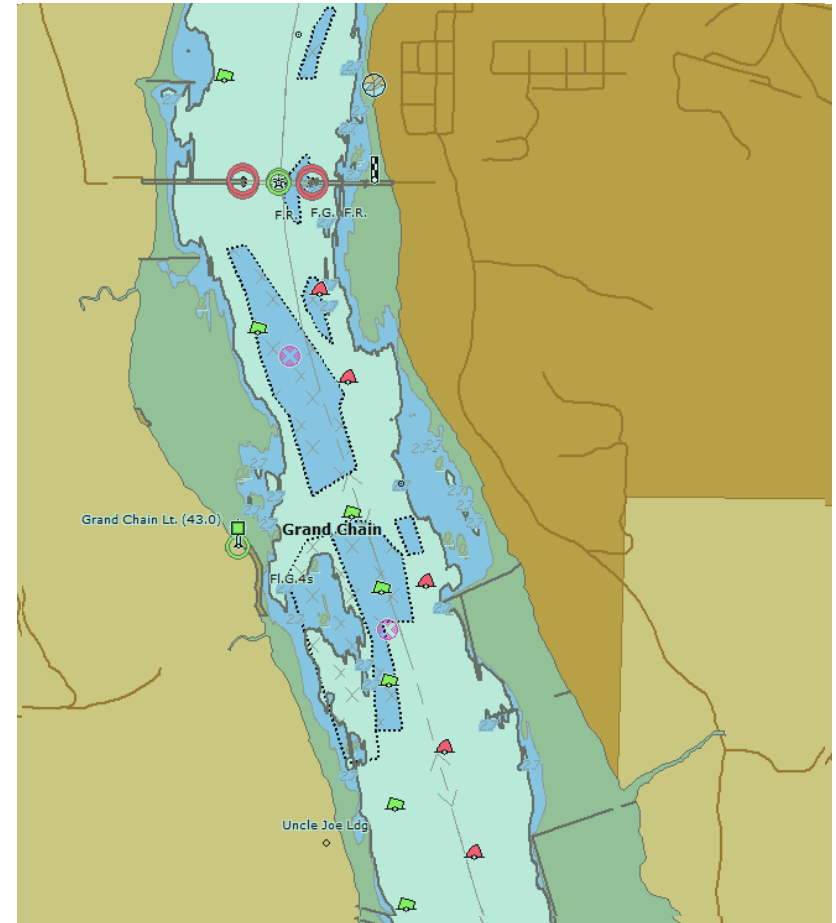
IENC displayed in electronic chart system on Coast Guard river tender;

- IENC overlay from eHydro process displayed,
- Optimum buoy positions based on river stage computed and displayed



IENC OVERLAYS: USCG BUOY PLACEMENT DURING LOW WATER EVENT 2022

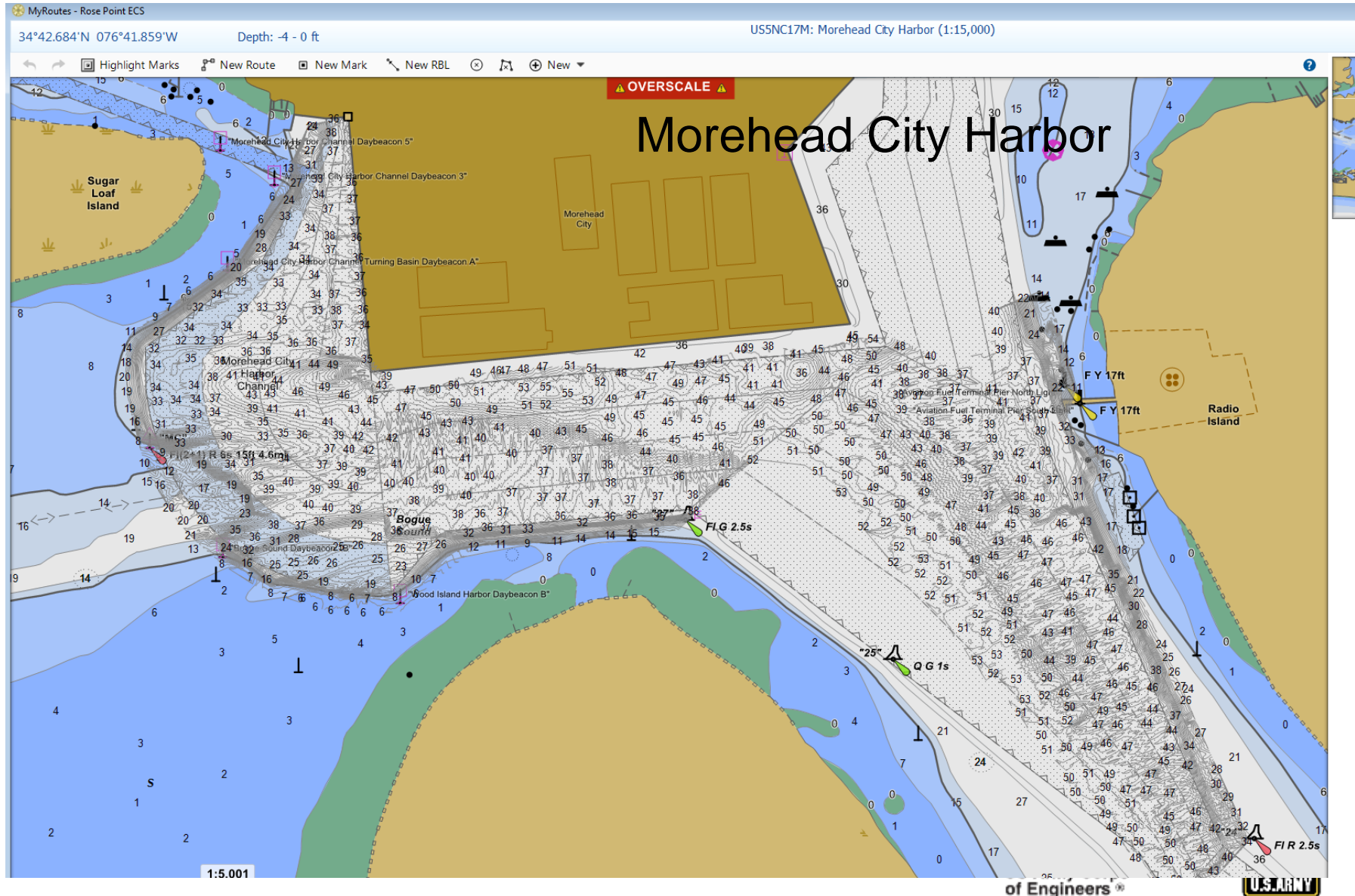
- USACE Survey data → USCG for rock pinnacle area on Upper Miss River near Grand Chain
- USCG Cutters used surveys to place buoys
- USCG → Excel file with Buoy Locations
- USACE created Buoy Overlay for USCG & Towing



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Sample Coastal Survey Overlay from eHydro



IENC Overlays: Chart U37UM079 with Proposed Fleet & Low Water Buoy Overlay (3UAJCPAF)

